Claims

1. A material comprising a substantially plane slab of a metal having on one surface one or more indents of a depth approximately 5 to 20 times a roughness of said surface and a width approximately 5 to 15 times said depth.

2. The material of claim 1 in which walls of said indents are substantially perpendicular to one another.

3. The material of claim 1 in which edges of said indents are substantially sharp.

4. The material of claim 1 in which the Fermi energy level of electrons is increased compared to a material comprising a substantially plane slab of the same metal not having on one surface one or more indents.

5. The material of claims 1 to 4 wherein said metal comprises an oxidation-resistant metal.

6. The material of claims 1 to 4 wherein said metal is substantially homogenous.

7. The material of claims 1 to 4 wherein said metal is selected from the group consisting of: lead, tin and gold.

8. The material of claims 1 to 4 wherein said metal is substantially free of granular irregularities.

9. The material of claims 1 to 4 wherein said metal is a monocrystal.

10. The material of claims 1 to 4 wherein said depth $\lambda/2$, wherein λ is the de Broglie wavelength.

11. The material of claims 1 to 4 wherein said depth is greater than the surface roughness of the metal surface.

12. The material of claims 1 to 4 wherein said width $>> \lambda$, wherein λ is the de Broglie wavelength.

13. The material of claims 1 to 4 wherein a thickness of said slab is a multiple of said depth.

14. The material of claims 1 to 4 wherein a thickness of said slab is not a multiple of said depth.

15. The material of claims 1 to 4 wherein a thickness of said slab is between 5 and 15 times said depth.

16. The material of claims 1 to 4 wherein a thickness of said slab is in the range 15 to 75nm.

17. A method of creating on one surface of a substantially plane slab one or more indents of a depth approximately 5 to 20 times a surface roughness of said surface and a width approximately 5 to 15 times said depth, comprising:

(a) depositing a layer of material on said surface;
(b) ablating a portion of said layer by means of electromagnetic radiation to expose portions of said surface;
(c) creating one or more indents at a substantially 90 degree angle to said surface by etching said exposed portions to a uniform depth;
(d) removing remaining portions of said layer.

18. The method of claim 17 wherein said step of ablating a portion of said layer by means of electromagnetic radiation to expose portions of said surface does not damage said surface.

19. The method of claim 17 wherein said step of ablating a portion of said layer by means of electromagnetic radiation is done with an e-beam.

20. The method of claim 17 wherein said step of ablating a portion of said layer by means of electromagnetic radiation is done with an ion beam.

21. The method of claim 17 wherein said material comprises a metal.

22. The method of claim 21 wherein said metal comprises an oxidation-resistant metal.

23. The method of claim 21 wherein said metal is substantially homogenous.

24. The method of claim 21 wherein said metal is selected from the group consisting of: lead, tin and gold.

25. The method of claim 21 wherein said metal is substantially free of granular irregularities.

26. The method of claim 21 wherein said metal is a monocrystal.

27. A method of fabricating an electrode pair precursor comprising the steps:

(a) providing a silicon wafer;
(b) creating on one surface of said wafer one or more indents of a depth approximately 5 to 20 times a roughness of said surface and a width approximately 5 to 15 times said depth;
(c) depositing a first layer forming a substantially plane slab on said silicon wafer;
(d) depositing a second layer on said first layer;
(e) forming a third layer on said second layer.

28. A method of fabricating an electrode pair precursor comprising the steps:

(a) providing a silicon wafer;
(b) depositing a first layer on said silicon wafer;
(c) depositing a second layer forming a substantially plane slab of a material on said first layer;
(d) creating on one surface of said second layer one or more indents of a depth approximately 5 to 20 times a roughness of said surface and a width approximately 5 to 15 times said depth;
(e) forming a third layer on said second layer.

29. The method of claim 27 or 28 wherein said first layer comprises titanium.

30. The method of claim 27 or 28 wherein said second layer comprises silver.

31. The method of claim 27 or 28 wherein said third layer comprises copper.

32. The method of claim 27 or 28 wherein the method for forming said third layer of copper comprises electrolytic growth of copper.

33. The method of claim 17, 27 or 28 wherein said step of creating one or more indents is done by etching to a depth $\lambda/2$, wherein λ is the de Broglie wavelength.

34. The method of claim 17, 27 or 28 wherein said step of creating one or more indents is done by etching to a depth that is a multiple of said thickness.

35. The method of claim 17, 27 or 28 wherein said step of creating one or more indents is done by etching to a depth that is not a multiple of said thickness.

36. The method of claim 17, 27 or 28 wherein said step of creating one or more indents is done by etching to a depth that is between a fifth and a fifteenth of said thickness.

37. The method of claim 17, 27 or 28 wherein said step of creating one or more indents is done by etching to a depth that is in the range 15 to 75nm.

38. The method of claim 17, 27 or 28 wherein said step of etching at a substantially 90 degree angle to said surface said exposed portions to a uniform depth is done by reacting a chemical etchant with the exposed surface.

39. The method of claim 17, 27 or 28 wherein said step of etching at a substantially 90 degree angle to said surface said exposed portions to a uniform depth is done by reacting a plasma etchant with the exposed surface.

40. The method of claim 17, wherein said material is an insulator, additionally comprising the step of:

(a) depositing a thin layer of metal on said indented surface.

41. An electrode pair precursor comprising:

(a) a silicon wafer having on one surface one or more indents of a depth approximately 5 to 20 times a roughness of said surface and a width approximately 5 to 15 times said depth;

(b) a first layer of a substantially plane slab deposited on said silicon wafer;

(c) a second layer deposited on said first layer;

(d) a third layer deposited on said second layer.

42. An electrode pair precursor comprising:

(a) a silicon wafer;

(b) a first layer deposited on said silicon wafer;

(c) a second layer forming a substantially plane slab of a material deposited on said first layer, and having on one surface one or more indents of a depth approximately 5 to 20 times a roughness of said surface and a width approximately 5 to 15 times said depth;

(d) a third layer deposited on said second layer.

43. The electrode pair precursor of claim 41 or 42 wherein said first layer comprises titanium.

44. The electrode pair precursor of claim 41 or 42 wherein said second layer comprises silver.

45. The electrode pair precursor of claim 41 or 42 wherein said third layer comprises copper.

46. The electrode pair precursor of claim 41 or 42 wherein the method for forming said third layer of copper comprises electrolytic growth of copper.

47. The electrode pair precursor of claim 41 or 42 wherein said depth $\lambda/2$, wherein l is the de Broglie wavelength.

48. The electrode pair precursor of claim 41 or 42 wherein said depth is greater than the surface roughness of the metal surface.

49. The electrode pair precursor of claim 41 or 42 wherein said width $>> \lambda$, wherein λ is the de Broglie wavelength.

50. The electrode pair precursor of claim 41 or 42 wherein a thickness of said slab is a multiple of said depth.

51. The electrode pair precursor of claim 41 or 42 wherein a thickness of said slab is not a multiple of said depth.

52. The electrode pair precursor of claim 41 or 42 wherein a thickness of said slab is between 5 and 15 times said depth.

53. The electrode pair precursor of claim 41 or 42 wherein a thickness of said slab is in the range 15 to 75nm.